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THE STATUS, CORRECT NAME, AND GEOGRAPHIC RANGE OF THE BOREAL CHORUS FROG

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In the late 1940's my wife and I found it necessary to review the relationships of two races of *Pseudacris nigrita* (Le Conte) in the Mississippi Valley in order to allocate properly the populations of chorus frogs occurring in Illinois. In the course of our investigation, we realized that considerable revision of the distributional and morphological concepts of the subspecies *septentrionalis* would be required if it were to be recognized. Consideration of its status was avoided in our study (Smith and Smith, 1952), inasmuch as we were not directly concerned with it in Illinois. The boreal chorus frog was included in a key to the subspecies of *P. nigrita,* however, and its range was vaguely stated as including high elevations in the Rocky Mountains. Although some information regarding the status of the northern race was accumulated during our study of *triseriata* and *feriarum,* we withheld these data in the belief that a monographic treatment of *Pseudacris* was forthcoming by Dr. Charles F. Walker, the foremost student of the genus. Dr. Walker now informs me (pers. comm.) that he has no immediate plans to publish on western chorus frogs, and at the urging of friends I am offering the following notes on the race currently referred to as *P. n. septentrionalis.*

Acknowledgments. I am indebted to Dr. Hobart M. Smith, who was my major professor at the time much of the data presented herein was assembled, and to Drs. H. K. Gloyd, S. A. Minton, and Roger Conant for helpful suggestions and criticisms. I am indebted to Mr. Benjamin Shreve for supplying measurements on cotypes deposited at the Museum of Comparative Zoology and to the following museum officials for their kindness in lending specimens for study: C. M. Bogert, W. J. Breckenridge, G. C. Carl, D. M. Cochran, R. A. Edgren, D. F. Hoffmeister, E. B. S. Logier, J. E. Moore, A. I. Ortenburger, K. P. Schmidt, A. Loveridge, F. A. Shannon, E. H. Taylor, and C. F. Walker.

The sources of material examined are cited by the following abbreviations:

AMNH	American Museum of Natural History.
BC	Provincial Museum of British Columbia.
CNHM	Chicago Natural History Museum.
FAS	Dr. Fred A. Shannon.
INHS	Illinois Natural History Survey.
KU	University of Kansas Museum of Natural History.
MCZ	Museum of Comparative Zoology at Harvard.
OU	University of Oklahoma Museum of Zoology.
RAE	Dr. Richard A. Edgren.
ROM	Royal Ontario Museum of Zoology and Paleontology.
UA	University of Alberta Museum.
UIMNH	University of Illinois Museum of Natural History.
UM	University of Minnesota Museum of Natural History.
UMMZ	University of Michigan Museum of Zoology.
USNM	United States National Museum.

Historical Résumé. Boulenger (1882) described *Chorophilus septentrionalis* from specimens taken at Great Bear Lake, Northwest Territory, Canada, on the basis of the unusually short legs of the northern frogs. Cope (1889), without explanation, placed the name in the synonymy of *Chorophilus triseriatus* (Wied). Dickerson (1906), on the authority of Dr. Stejneger, resurrected *septentrionalis* as a subspecific name for the Canadian race of *Chorophilus nigritus* (Le Conte). Stejneger (Stejneger and Barbour, 1917), however, elevated Boulenger's name to specific status, and Wright and Wright (1933) again reduced it to subspecific rank. Since that time *septentrionalis* has been generally recognized, but its geographic and morphological limits have been but vaguely defined in the herpetological literature. The southern limit of its range has been defined, apparently for purposes of administrative facility, as approximately the International Boundary separating Canada and western United States. Its diagnostic characters, when given at all, have usually had indefinite reference to short leg length. Schmidt (1938), who pointed out a correlation between latitude and leg length of frogs, alluded to *septentrionalis* as "doubtfully distinct."

The status of the boreal chorus frog. The northern race of *P. nigrita* is exceedingly similar to *triseriata;* and, if their slight differences could be demonstrated to be opposite extremes of a regular leg-length cline, relegation of *septentrionalis* to the synonymy of *triseriata* would be the most desirable solution. The evidence available suggests, however, that the two forms are different biological populations, despite the similarity and the wide overlap of diagnostic characters. If the boreal subspecies is taxonomically separable from *triseriata,* its geographic range must be regarded as including northern Minnesota, North Dakota, and all of the Rocky Mountain states (except parts of Arizona and New Mexico) as well as central Canada. The revised concept of its range encompasses the type locality of a nominal, but identical, "species" with an earlier name, *Hyloaes maculatus,* which accordingly becomes the correct name for the boreal chorus frog.

Pseudacris nigrita maculata (Agassiz)

Hylodes maculatus Agassiz, Lake Superior . . ., 1850, p. 378, pl. 6, figs. 1-3 (north shore of Lake Superior; revised to vicinity of Sault Ste. Marie by Schmidt, 1953).

Chorophilus septentrionalis Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 335, pl. 23, fig. 1 (Great Bear Lake, Northwest Territory, Canada).

Chorophilus nigritus septentrionalis, Dickerson, 1906, p. 157.

Pseudacris septentrionalis, Stejneger & Barbour, 1917, p. 31.

Pseudacris nigrita septentrionalis, Wright & Wright, 1933, pp. 92-93.

Hyla canadensis Noble, Amer. Mus. Nov., no. 70, 1923, p. 5 (substitute name for *septentrionalis* which is preoccupied in *Hyla*).

Rediagnosis.—A northern race of *Pseudacris nigrita*, allied and very close to *P. n. triseriata* from which it differs by the proportionately shorter tibia, femur, and foot; relatively shorter and narrower head; proportionately heavier body; and by the higher frequency of specimens with a spotted or mottled pattern.

TABLE 1.—Comparison of diagnostic proportional characters of *P. n. maculata* and *P. n. triseriata*.

	maculata	triseriata*
Number of specimens	343	430
Tibia length/body length ratios	32-46	37-49
Mean ± 1 S. E.	39.3 ± .15	42.6 ± .10
1 Standard Deviation	2.84	2.09
Number of specimens	57	—
Head length/body length ratios	24-34	25-35
Mean ± 1 S. E.	29.3 ± .26	30.0
1 Standard Deviation	1.97	—
Number of specimens	54	—
Head width/body length ratios	23-32	25-34
Mean ± 1 S. E.	27.4 ± .28	29.0
1 Standard Deviation	2.10	—

*Data from Smith and Smith, 1952.

Types.—Two cotypes, MCZ 38. The two cotypes have tibia/body ratios of 38.5 and 41.6, head length/body length ratios of 30.7 and 29.1, and head width/body length ratios of 23.1 and 25.0. Tibia/body ratios for four near topotypes (AMNH 5127 and three specimens reported by Jacobs, 1950) range from 31.2 to 41.7, averaging 38.5.

Remarks.—The name *septentrionalis* has been used exclusively, although infrequently, for 50 years and accordingly would seem a worthy candidate for the Official List of Conserved Names. However, there are extenuating circumstances in the present case that make strict application of priority the more simple solution. In keeping with a decision of the International Commission at Paris, *Chorophilus septentrionalis* Boulenger, 1882, must be rejected as a secondary junior homonym of *Hyla septentrionalis* Schlegel, 1837 (*fide* Mittleman, 1950) or *Hyla septentrionalis* Duméril and Bibron, 1841 (*fide* Myers, 1950), and *Pseudacris n. canadensis* Noble accepted as the valid name of the boreal

chorus frog since Noble (1923), clearly recognizing the homonymy created by his union of *Pseudacris* and *Hyla*, expressly proposed *canadensis* as a substitute name. It is perhaps fortunate that the name *maculata*, which is earlier than either *septentrionalis* or *canadensis*, is available for the northern race.

Variation.—The provenance of the material studied lends itself to being divided arbitrarily into six samples which may be compared for purposes of discerning geographic variation. Sample A, consisting of *maculata* × *triseriata* intergrades, includes all specimens from northern Wisconsin, central and southwestern Minnesota, northwestern Iowa, eastern South Dakota, and eastern Nebraska. Sample B, consisting of typical *maculata*, includes all specimens from Ontario, northern Minnesota, North Dakota, and southern Manitoba; sample C, central and northern Manitoba, Alberta, Saskatchewan, British Columbia, and Northwest Territory; sample D, Idaho, Montana and northern Wyoming; sample E, Utah, Colorado, and southern Wyoming; and sample F, consisting of specimens tentatively referred to *triseriata*, includes the few specimens available from Arizona and New Mexico.

TABLE 2.—Geographic variation in six samples of *Pseudacris nigrita* from Canada and western United States.

Sample	Number of specimens	Tibia/body ratios Range	Mean	S.D.	Number of specimens	% specimens striped
A	104	32-46	40.5 ± .23	2.4	93	95
B	172	32-44	38.7 ± .22	2.9	93	85
C	69	34-45	38.5 ± .30	2.5	47	70
D	79	32-46	39.6 ± .16	1.5	68	44
E	62	36-45	39.6 ± .24	1.9	49	69
F	33	39-46	42.8 ± .30	1.7	30	84

The proportionate leg length in sample A is somewhat greater, presumably because of the genetic influence of adjacent populations of *triseriata*, although the mean is actually close to that of *maculata* rather than exactly intermediate between that of *triseriata* and *maculata*. Samples B and C are aligned in an east to west direction. Although these samples are from an area over 1,500 miles in width, relatively little variation in tibial length means is apparent. The frequency of distinctly striped individuals appears to decrease toward the west, but this suggested cline may be fortuitous, particularly since distinguishing a striped from a mottled pattern is quite subjective in many cases. Samples C, D, E, and F are aligned in a north to south direction covering a distance of over 2,000 miles. A comparison of the means of C, D, and E reveals that the leg length gradient predicted by Schmidt (1938) is not apparent, at least intraracially. The somewhat higher means for samples D and E are probably fortuitous, although there is a possibility that a slight correlation may exist between elevation and proportionate leg length. The differences in frequencies of striped individuals in the three samples are probably insignificant.

Sample F from central Arizona and northern New Mexico contains specimens inseparable, from a practical standpoint, from *triseriata* of

the tall grass prairie region, and the few specimens at hand are so assigned, pending the availability of additional series from the critical areas. The specimens I have examined are: *ARIZONA:* UMMZ 79156 (12), 11 mi. S Springerville and UMMZ 99154(2), 17 mi. S Springerville, Apache Co.; USNM 58082, Flagstaff, UMMZ 79153(2), 23 mi. SW Heber, and UMMZ 113848(3), Mormon Lake, Coconino Co.; FAS 1 spec., 8 mi. NNW Lakeside, Navajo Co.; AMNH 772, Fort Verde, Yavapai Co. *NEW MEXICO:* UMMZ 79155(2), David Lee Lake, Catron Co.; and OU 21642-54, Las Vegas, San Miguel Co. It is hoped that this paper will call attention to the problem and that western investigators may clarify the status of the southern populations.

Range.—See fig. 1. In Canada *P. n. maculata* occurs north to the south edge of Great Bear Lake and the southern border of Hudson Bay; east

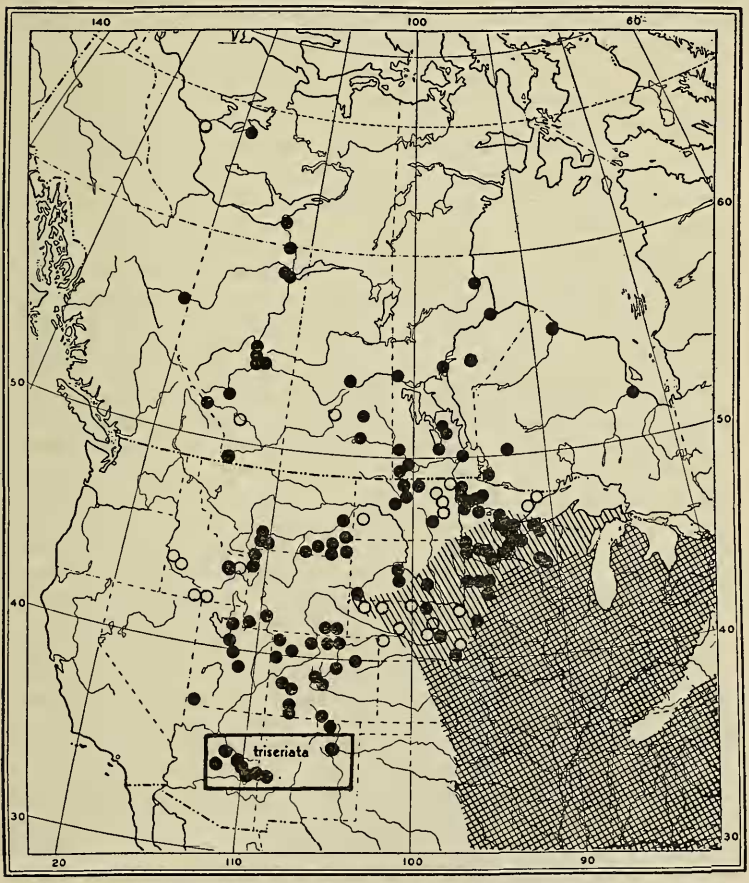

Fig. 1. Distribution of *Pseudacris nigrita* in western North America.

to James Bay; and west to Peace River District, B. C. In the United States it occurs east to northeastern Minnesota; west to the Oregon border; and south through the Rockies to southern Utah and northern New Mexico, south of which it is replaced by a form tentatively regarded as a disjunct western population of *triseriata.* Intergradation of *maculata* and *triseriata* occurs in a rather wide belt extending through northern Wisconsin, central Minnesota, southeastern South Dakota, northwestern Iowa, and most of Nebraska.

Localities from which specimens have been examined are plotted on fig. 1 by solid symbols; published records, by hollow circles. No attempt has been made to locate all published records, but locality records for certain areas on the periphery of the range of *maculata* have been transcribed from the following distributional summaries: Logier and Toner, 1955 (Canada); Tanner, 1941 (Idaho); Hudson, 1942 (Nebraska); and Wheeler, 1947 (North Dakota). The distribution of adjacent subspecies is indicated on fig. 1 by a cross hatch pattern; the area of integradation of *maculata* and *triseriata* is designated by parallel lines.

In the interest of saving space, two departures from usual practice in citing localities and records have been employed. First, the sources of the specimens examined are indicated only by the initials of the museums, and the exact specimen numbers of the material have been omitted. Second, the localities in the United States are designated only by the names of the counties, and the detailed list of precise localities has been omitted.

Locality records for Pseudacris nigrita maculata (403 specimens examined): *ALBERTA:* Brewster Creek, SW Banff CNHM, UA; 15 mi. NW Chipewyan MCZ; Fort Chipewyan (Logier & Toner, 1955); Edmonton CNHM, MCZ, USNM; 28 mi. N. Edmonton USNM; Ft. Smith AMNH, USNM; High River (Logier & Toner, 1955); Rocky Mountain House CNHM; Spring Creek CNHM; Slave River, Athabaska USNM; 20.8 mi. N Waterton UMMZ. *BRITISH COLUMBIA:* Charlie Lake BC; Tupper Creek, Peace River BC; North Pine River (Logier & Toner, 1955). *COLORADO:* Archuleta Co. USNM; Boulder Co. USNM; Costilla Co. USNM; Delta Co. USNM; Denver Co. USNM; Gunnison Co. OU; Jackson Co. MCZ; Lake Co. USNM; Larimer Co. INHS; Mesa Co. UIMNH; Mineral Co. MCZ; Moffat Co. USNM; Park Co. USNM; Rio Blanco Co. USNM; Routt Co. USNM; Washington Co. USNM; Weld Co. AMNH. *IDAHO:* Ada Co. (Tanner, 1941); Canyon Co. (Tanner, 1941); Cassia Co. (Tanner, 1941); Jefferson Co. UMMZ; Teton Co. (Tanner, 1941); Twin Falls Co. (Tanner, 1941). *MANITOBA:* Boissevain AMNH, USNM; Delta CNHM; Ft. Garry, 20 mi. N Winnipeg AMNH; Gypsumville ROM; Horseshoe Lake ROM; Lake St. Martin ROM; Landing Lake near Churchill (Logier & Toner, 1955); Norway House USNM; Oxford House USNM; St. Charles, near Winnipeg ROM; Selkirk Settlement USNM; Shoal Lake USNM; The Pas ROM, UM; Treesbank AMNH; York Factory USNM. *MINNESOTA:* Becker Co. UM; Beltrami Co. UM; Clay Co. UM; Clearwater Co. UM, AMNH, CNHM; Cook Co. (Jacobs, 1950); Lake Co. (Jacobs, 1950); Mahnomen Co. UM; Marshall Co. UM; Polk Co. UM; Traverse Co. UM. *MONTANA:* Big Horn Co. USNM; Carter Co. USNM; Custer Co. USNM; Dawson Co. USNM; Fallon Co. USNM; Powder River Co. USNM; Rose-

bud Co. USNM; Stillwater Co. USNM; Sweet Grass Co. USNM; Wheatland Co. USNM. *NORTH DAKOTA:* Billings Co. (Wheeler, 1947); Bottineau Co. MCZ; Griggs Co. (Wheeler, 1947); McHenry Co. USNM; Nelson Co. (Wheeler, 1947); Pembina Co. (Wheeler, 1947); Ramsey Co. (Wheeler, 1947); Rolette Co. UM; Stutsman Co. UM; Ward Co. USNM. *NORTHWEST TERRITORY:* Fort Norman (Logier & Toner, 1955); Fort Resolution USNM; Great Bear Lake MCZ. *ONTARIO:* Cochrane District, Ft. Albany ROM; Patricia District, Ft. Severn ROM; Goldpines, on Lac Seul ROM; Rainy River District, Emo ROM; Lake Superior, north shore AMNH. *SASKATCHEWAN:* Edenwold ROM; Quill Lake CNHM; Saskatoon (Logier & Toner, 1955); Waskesiu Lake ROM. *SOUTH DAKOTA:* Harding Co. USNM; Jones Co. AMNH; Stanley Co. USNM; Washington Co., Battle Creek Canyon CNHM. *UTAH:* Emery Co. INHS; Salt Lake Co. AMNH; Utah Co. UIMNH, USNM; Washington Co. FAS; Weber Co. MCZ. *WYOMING:* Albany Co. USNM, MCZ; Laramie Co. MCZ; Sweetwater Co. AMNH; Teton Co. INHS, USNM; Uinta Co. KU, USNM; Yellowstone National Park AMNH, MCZ, USNM.

Locality records for Pseudacris n. maculata X *triseriata intergrades* (125 specimens examined): *IOWA:* Monana Co. AMNH; Palo Alto Co. USNM. *MINNESOTA:* Anoka Co. UM; Carleton Co. UM; Cass Co. UM; Chisago Co. UM; Crow Wing Co. UM; Hennepin Co. Isanti Co. UM; Jackson Co. UM; Kandiyohi Co. UM; Lac Qui Parle Co. UM; Meeker Co. UM; McLeod Co. UM; Mille Lacs Co. UM; Pine Co. UM; Ramsey Co. UM; Rock Co. UM; Scott Co. UM; Wadena Co. UM; Washington Co. UM. *NEBRASKA:* Boyd Co. (Hudson, 1942); Cherry Co. (Hudson, 1942); Dakota Co. (Hudson, 1942); Holt Co. CNHM, USNM; Jefferson Co. USNM; Keya Paha Co. (Hudson, 1942); Lancaster Co. (Hudson, 1942); Logan Co. (Hudson, 1942); Merrick Co. USNM; Perkins Co. (Hudson, 1942); Sheridan Co. (Hudson, 1942); Sherman Co. (Hudson, 1942); Wheeler Co. (Hudson, 1942); *NEW MEXICO:* Colfax Co. AMNH. *SOUTH DAKOTA:* Brookings Co. AMNH; Lyman Co. AMNH. *WISCONSIN:* Ashland Co. CNHM; Bayfield Co. RAE; Burnett Co. CNHM; Chippewa Co. AMNH; Clark Co. CNHM.

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